

II B.Tech I Semester Regular Examinations, November 2006**PROBABILITY AND STATISTICS****(Common to Computer Science & Engineering, Information Technology
and Computer Science & Systems Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) For any three arbitrary events A,B,C , prove that

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$$
- (b) In a certain town 40% have brown hair, 25% have brown eyes and 15% have both brown hair and brown eyes. A person is select at random from the town
 - i. If he has brown hair, what is the probability that he has brown eyes also
 - ii. If he has brown eyes, determine the probability that he does not have brown hair

[8+8]
2. (a) For the continuous probability function $f(x) = kx^2e^{-x}$ when $x \geq 0$, find
 - i. k
 - ii. mean
 - iii. variance
- (b) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random.
 - i. none is defective
 - ii. one is defective
 - iii. $p(1 < x < 4)$

[8+8]
3. (a) If a Poisson distribution is such that $P(x=1) \cdot \frac{3}{2} = P(x=3)$. Find
 - i. $p(x \geq 1)$
 - ii. $p(x \leq 3)$
 - iii. $p(2 \leq x \leq 5)$
- (b) A sales tax officer has reported that the average sales of the 500 business that he has to deal with during a year is Rs.36,000 with a standard deviation of 10,000. Assuming that the sales in these business are normally distributed, find
 - i. the number of business as the sales of while are Rs.40,000
 - ii. the number of business the sales of while are likely to range between Rs. 30,000/- and Rs.40,000/-

[8+8]
4. (a) What is the probability that X will be between 75 and 78 if a random sample of size 100 taken from an infinite population has mean 76 and variance 256.

- (b) Write about
- Null hypothesis
 - Type 1 & type II errors. [8+8]
5. (a) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence.
- (b) Among 900 people in a state 90 are found to be chapatti eaters. Construct 99% confidence interval for the true proportion.
- (c) A random sample of 1200 apples was taken from a large consignment and found that 10% of them are bad. The supplier claims that only 2% are bad. Test his claim at 95% level. [5+5+6]
6. From the following data find whether there is any significant liking in the habit of taking soft drinks among the categories of employees. [16]

		Employees	
		Clerks	Teachers
Soft drinks			Officers
Pepsi	10	25	65
Thums up	15	30	65
Fanta	50	60	30

7. (a) A chemical company, wishing to study the effect of extraction time on the efficiency of an extraction of an extraction operation, obtained the data shown in the following table: [8+8]

Extraction time

minutes(x)	27	45	41	19	35	39	19	49	15	31
Efficiency % (y)	57	64	80	46	62	72	52	77	57	68

Fit a straight line to the given data by the method of least squares.

- (b) Fit a quadratic function to the following data which gives the drying time and the amount of additive that is intended to reduce the drying time:

Varnish additive (x in grams)	0	1	2	3	4	5	6	7	8
Drying time (y in hours)	12.0	10.5	10.0	8.0	7.0	8.0	7.5	8.5	9.0

8. The marks obtained by 10 students in mathematics and statistics are given below. Find the coefficient of correlation between the two subjects and the two lines of regression. [16]

Marks in maths	75	30	60	80	53	35	15	40	38	48
Marks in statistics	85	45	54	91	58	63	35	43	45	44

II B.Tech I Semester Regular Examinations, November 2006**PROBABILITY AND STATISTICS**

(Common to Computer Science & Engineering, Information Technology
and Computer Science & Systems Engineering)

Time: 3 hours**Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) State and prove the theorem of total probability
(b) In a certain college 25% of the students failed in Mathematics, 15% failed in chemistry and 10% in Mathematics and chemistry. A student is selected at random.
 - i. If he/she failed in chemistry, what is the probability that he/she failed in Mathematics.
 - ii. If he/she failed in Mathematics, what is the probability that he/she failed in chemistry. [6+10]
2. (a) If X and Y are discrete random variables and K is a constant then prove that.
 - i. $E(X + K) = E(X) + K$
 - ii. $E(X+Y) = E(X) + E(Y)$(b) Out of 800 families with 5 childrens each, how many would you expect to have
 - i. 3 boys
 - ii. At least one boy. [8+8]
3. (a) Define Poisson distribution and find its variance and the mean.
(b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63. [8+8]
4. A population consists of 5,10,14,18,13,24 consider all possible samples of size two which can be drawn without replacement from the population. Find
 - (a) The mean of the population.
 - (b) The standard deviation of the population.
 - (c) The mean of the sampling distribution of means
 - (d) The standard deviation of sampling distribution of means. [4X4]
5. (a) A lady stenographer claims that she can take dictation at the rate of 118 words per minute can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words and a S.D of 15 words.
(b) In a large consignment of oranges a random sample of 64 oranges revealed that 14 oranges were bad. If it reasonable to ensure that 20% of the oranges are bad? [8+8]

6. Four methods are under development for making discs of a super conducting material. Fifty discs are made by each method and they are checked for super conductivity when cooled with liquid.

	1 st Method	2 nd Method	3 rd Method	4 th Method
Super Conductors	31	42	22	25
Failures	19	8	28	25

Test the significant difference between the proportions of Superconductors at .05 level. [16]

7. Fit an equation of the form $Y = ab^x$ to the following data: [16]

x:	2	3	4	5	6
y:	144	172.8	207.4	248.8	298.5

8. Find the least squares regression equation of X_1 on X_2 and X_3 from the following data. [16]

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	14

II B.Tech I Semester Regular Examinations, November 2006**PROBABILITY AND STATISTICS****(Common to Computer Science & Engineering, Information Technology
and Computer Science & Systems Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) Two cards are selected at random from 10 cards numbered 1 to 10. Find the probability that the sum is even if
 - i. the two cards are drawn together
 - ii. the two cards are drawn one after the other with replacement.
- (b) State and prove Baye's theorem.
- (c) The probabilities of A,B,C to become M.D'S of a factory are 5/10,3/10,2/10. The probabilities that bonus scheme will be introduced if they become M.D's are .02,.03 and .04. Find the probabilities A,B,C to be become M.D's if bonus scheme introduced. [5+5+6]

2. (a) If $F(x)$ is the distribution function of X given by

$$\begin{aligned}
 F(x) &= 0 && \text{if } x \leq 1 \\
 &= k(x-1)^4 && \text{if } 1 < x \leq 3 \\
 &= 1 && \text{if } x > 3
 \end{aligned}$$

determine

- i. $f(x)$
 - ii. k
 - iii. Mean
- (b) Find the maximum n such that the probability of getting no head in tossing a coin n times is greater than .1 [8+8]
3. (a) Define Poisson distribution and find its variance and the mean.
- (b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63. [8+8]
4. Take 30 slips of paper and label 5 each -4 and 4, four each - 3 and 3, three each - 2 and 2 and each -1, 0 and 1, if each slip of the paper has the same probability of being drawn find the probabilities of getting - 4, - 3, - 2, - 1, 0, 1, 2, 3, 4 and find the mean and variance of this distribution of means. [16]
5. (a) 400 articles from a factory are examined and 3% are found to be defective. Construct 95% confidence interval.

- (b) A sample of 64 students have a mean weight of 70kgs. Can this be regarded as a sample from a population with mean weight 65kgs and standard deviation 25kgs.
- (c) Find the size of the sample if the S.D of the population is 9 and there should be 99 confidence that the error of estimate will not exceed 3. [5+5+6]
6. The following data gives the fields of interest and attitude to religion:

	Arts & Commerce	Science & Engineering	Total
Conformist	109	51	160
Non-Conformist	23	17	40
Total	132	68	200

Examine whether the field of interest and attitude to religion are associated. [16]

7. (a) Fit a straight line $y = a + bx$ for the following data

x	1	2	3	4	5	6
y	14	33	40	63	76	85

- (b) Fit a curve of the $y = ax^b$ for the following data [8+8]

x	1	2	3	4	5
y	.5	.2	4.5	8	12.5

8. 10 observations on price x and supply y the following data was obtained.

$$\sum x = 130, \sum y = 220, \sum x^2 = 2288, \sum y^2 = 5506 \text{ and } \sum xy = 3467$$

Find

- (a) coefficient of correlation
- (b) The line of regression of y on x
- (c) The standard error of estimate. [6+5+6]

II B.Tech I Semester Regular Examinations, November 2006**PROBABILITY AND STATISTICS****(Common to Computer Science & Engineering, Information Technology
and Computer Science & Systems Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) If $P(A) = 1/2$, $P(B) = 1/3$, $P(A \cap B) = 1/5$, then find
 - i. $P(A \cup B)$
 - ii. $P(A^c \cap B)$
 - iii. $P(A \cap B^c)$
 - iv. $P(A^c \cap B^c)$
 where (A^c = the compliment of A)
- (b) Three machines produces 70%, 20% and 10% of the total number of a factory. The percentage of defective output of these machines are 4%, 3% and 2% respectively. An item is selected at random and found defective. Find the probability that it is from
 - i. machine-I
 - ii. machine-II
 - iii. machine-III

[8+8]

2. (a) If X is a continuous random variable with distribution.

$$f(x) = \begin{cases} \frac{1}{6}x + k & \text{if } 0 \leq x \leq 3 \\ 0 & \text{elsewhere} \end{cases}$$

determine

- i. the value of k
 - ii. the mean
 - iii. $P(1 \leq x \leq 2)$
- (b) Derive the formula to find the mean and variance of Binomial distribution

[8+8]

3. (a) Define Poisson distribution and find its variance and the mean.
- (b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63.

[8+8]

4. A population consists of 5, 10, 14, 18, 13, 24 consider all possible samples of size two which can be drawn without replacement from the population. Find
 - (a) The mean of the population.
 - (b) The standard deviation of the population.

- (c) The mean of the sampling distribution of means
- (d) The standard deviation of sampling distribution of means. [4X4]
5. (a) A lady stenographer claims that she can take dictation at the rate of 118 words per minute can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words and a S.D of 15 words.
- (b) In a large consignment of oranges a random sample of 64 oranges revealed that 14 oranges were bad. If it reasonable to ensure that 20% of the oranges are bad? [8+8]
6. The following data gives the fields of interest and attitude to religion:

	Arts & Commerce	Science & Engineering	Total
Conformist	109	51	160
Non-Conformist	23	17	40
Total	132	68	200

Examine whether the field of interest and attitude to religion are associated. [16]

7. (a) The measurements of humidity and the moisture content in a raw material are given in the following table. Fit a St. line of the form $y = ax + b$ Humidity (x)

42	35	50	43	48	62	31	36	44	39	55	48
12	8	14	9	1	16	7	9	12	10	13	11

- (b) Find the most plausible values of x and y
 $x + 2y - 7 = 0$ $2x + 3y - 2 = 0$
 $x + 8y - 3 = 0$ $3x - y + 5 = 0$. [8+8]
8. (a) The regression equations of two variables x and y are
 $x = 0.7y + 5.2$, $y = 0.3x + 2.8$. Find the means of the variables and the coefficient of correlation between them
- (b) Consider the following data:

x	-4	-3	-2	-1	0	1	2	3	4
y	0.1	2.5	3.4	3.9	4.1	3.8	3.5	2.8	0.3

Find the correlation coefficient 'r'. [6+10]
